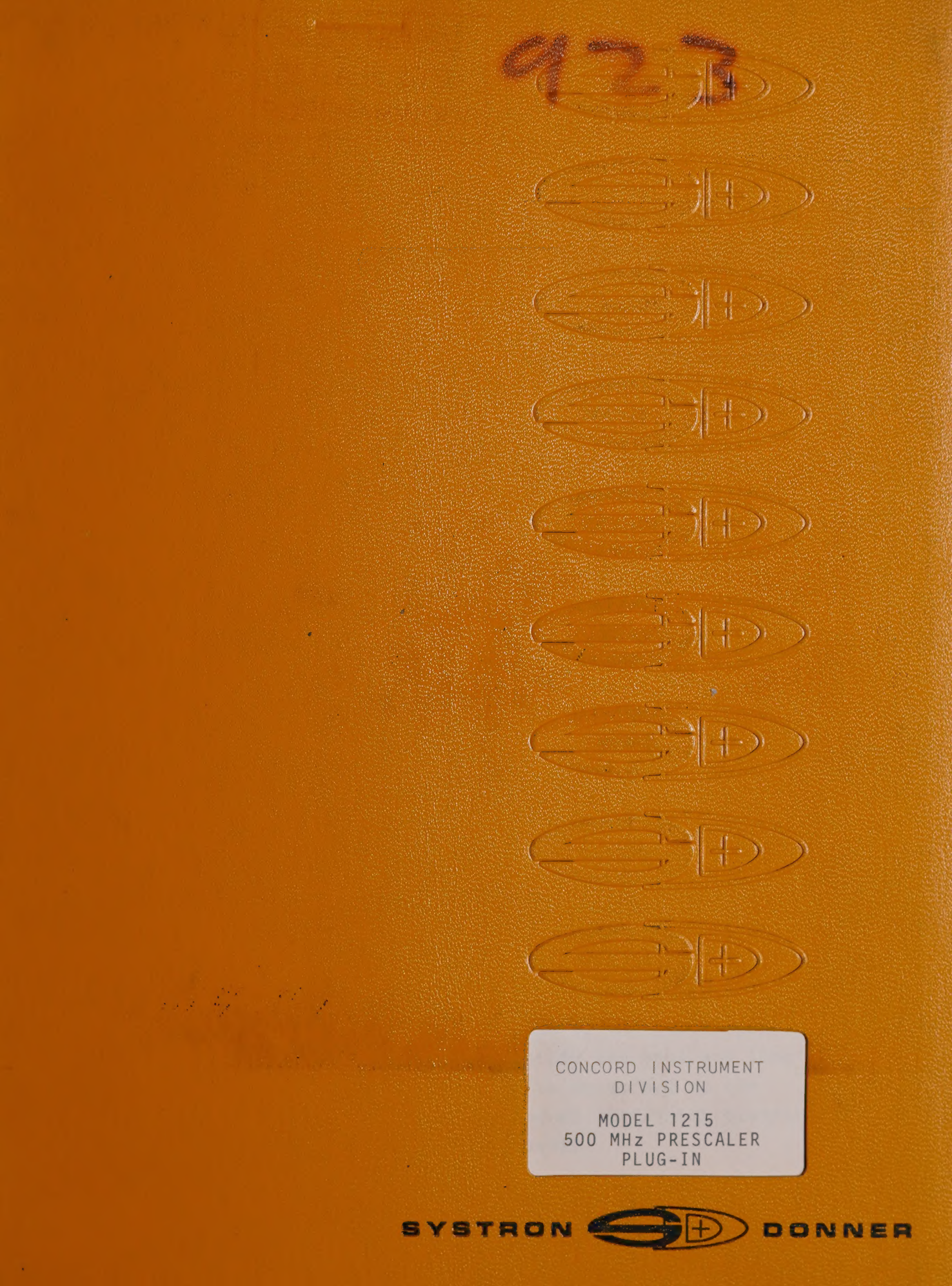

CONCORD INSTRUMENT
DIVISION

MODEL 1215
500 MHz PRESCALER
PLUG-IN

SYSTRON DONNER

Concord Instrument Division

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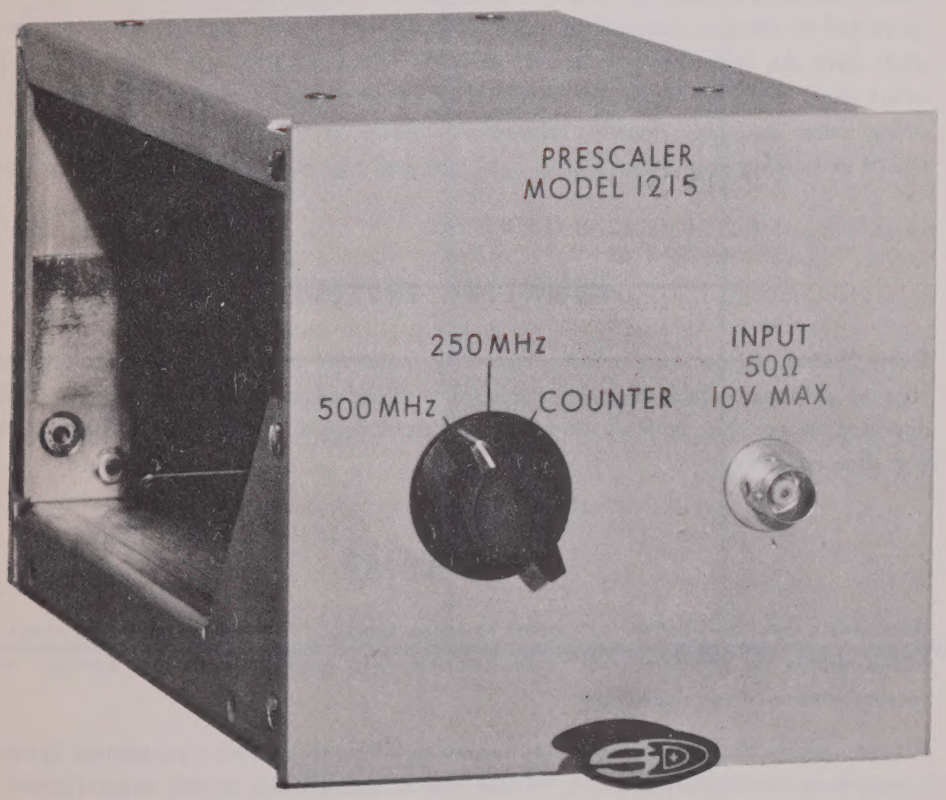
INSTRUCTION MANUAL



CONCORD INSTRUMENT
DIVISION

MODEL 1215
500 MHz PRESCALER
PLUG-IN

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SYSTRON DONNER CORPORATION

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Systron-Donner instruments are warranted during a period of one year from date of shipment to original purchaser to be free from defects in material and workmanship. This warranty does not apply to vacuum tubes, except as they are warranted by tube manufacturers. The liability of Seller under this warranty is limited to replacing or repairing any instrument or component thereof which is returned by Buyer at his expense during such period and which has not been subjected to misuse, neglect, improper installations, repair, alteration, or accident. Seller shall have the right of final determination as to the existence and cause of a defect. In no event shall Seller be liable for collateral or consequential damages. This warranty is in lieu of any other warranty, express, implied or statutory, and no agreement extending or modifying it will be binding upon Seller unless in writing and signed by a duly authorized officer.

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Every Systron Donner instrument is carefully inspected and is in perfect working order at the time of shipment. Each instrument should be checked as soon as received. If the unit is damaged in any way or fails to operate, a claim should immediately be filed with the transportation company.

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LIST OF EFFECTIVE PAGES

Original Dated: 7-70

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1-1 - 1-3	Original	4-1 - 4-16	Original
2-1 - 2-1	Original		

Errors found in this publication (other than obvious typographical errors), which have not been corrected by means of Temporary Corrections or Permanent Changes should be reported. Such report should include the complete title of the publication and publication number (short title); identify the page and line or figure and location of the error; and be forwarded to the Technical Publications Department, Concord Instrument Division, 888 Galindo St., Concord, California 94520.

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CHAPTER 1
GENERAL DESCRIPTION

1.1 GENERAL DESCRIPTION

The Model 1215 Prescaler Plug-in extends the digital frequency measuring capability of the Models 1037 and 1038 Counter/Timers to 500 MHz. Two extended counting ranges are provided: 10 MHz to 250 MHz and 10 MHz to 500 MHz (RANGE switch controlled on front of plug-in). Operation of the Model 1215 Plug-in is essentially automatic and is based on the technique illustrated in the block diagram (Figure 1.1).

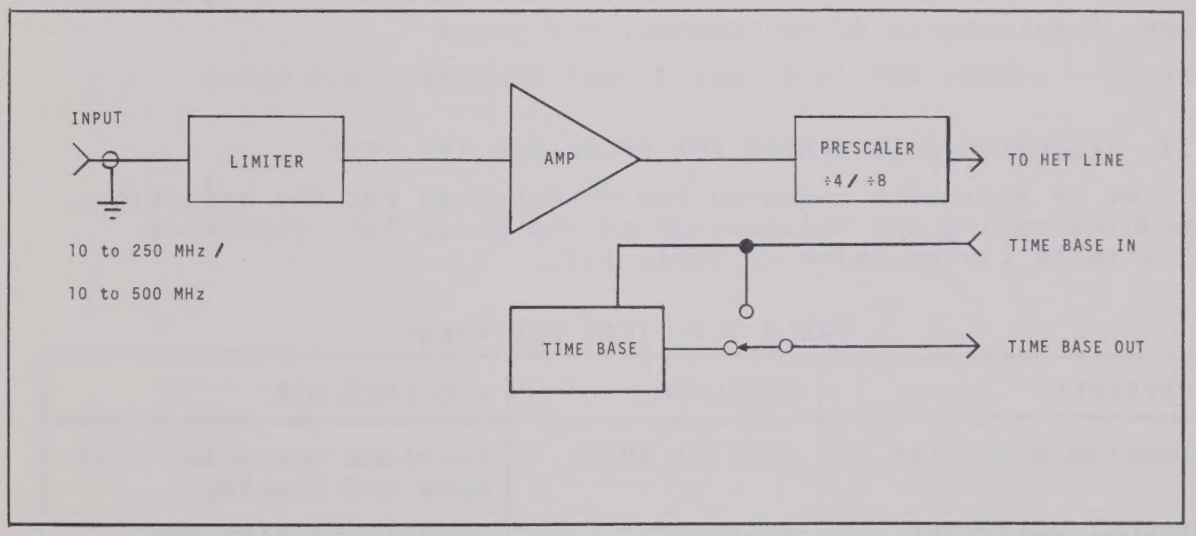

FIGURE 1.1 250 MHz/500 MHz PRESCALER BLOCK DIAGRAM MODEL 1215

The input signal is limited, amplified and, depending upon the range selected, scaled by a factor of 4 or 8 to bring it within the direct measuring range of the counter. Simultaneously, the counter time base is extended by a factor of 4 or 8 (again depending upon the range selected) resulting in a direct readout of the input signal frequency.

1.2 SPECIFICATIONS

Frequency Input Range - 10 MHz to 500 MHz

Frequency Output to Counter - 1/4 of input (250 MHz Range)

Frequency Output to Counter - 1/8 of input (500 MHz Range)

Accuracy - Same as parent counter

Input Sensitivity - 100 mV rms

Maximum Input Level - 10V rms

Input Impedance - 50Ω nominal

Power Requirements (from Counter) - 6 watts

Weight - 2 lbs. net (0.9 kg), 4 lbs. shipping (1.8 kg)

1.3 RECOMMENDED EQUIPMENT FOR OPERATION AND TEST

A list of equipment required but not supplied for the operation, troubleshooting, and calibration of the Model 1215 Prescaler Plug-in is listed below in Table 1.1.

TABLE 1.1 TEST EQUIPMENT

INSTRUMENT	MODEL NO.	REQUIRED USE
Electronic Counter	1037 or 1038	Provides operating voltages and display.
Digital Voltmeter	9000 (or equivalent)	Troubleshooting and Calibration
Oscilloscope	Tektronix 661 (or equivalent)	Troubleshooting and Calibration
Signal Generator	HP 651B (or equivalent)	Troubleshooting and Calibration
Signal Generator	HP 608C (or equivalent)	Troubleshooting and Calibration
Signal Generator	HP 612A (or equivalent)	Troubleshooting and Calibration

1.4 PREPARATION FOR RESHIPMENT

Should reshipment become necessary, contact the nearest Systron-Donner field office for shipping instructions. If possible,

use the original packaging materials. Systron-Donner field offices can provide materials similar to those used for original factory packaging. All correspondence should refer to the full nomenclature and serial number of the instrument involved.

CHAPTER 2
INSTALLATION

2.1 INSTALLATION REQUIREMENTS

The Model 1215 500 MHz Extender is designed for use ONLY with Models 1037 and 1038 Counter/Timers. DO NOT ATTEMPT TO OPERATE WITH ANY OTHER MODEL.

2.2 PHYSICAL INSPECTION

Upon receipt of the instrument, verify that it is intact as ordered. Check for loose or broken knobs, bent or broken connectors, and dents or scratches on the panel surfaces. If damage of any nature is noted, refer to the warranty and to paragraph 1.4 for repackaging and shipping instructions.

2.3 INSTALLATION IN PARENT COUNTER

The Model 1215 Extender is designed for use with the Models 1037 and 1038 Counters. Installation is simple and requires no tools or equipment. The following steps should be followed to facilitate installation.

1) Make sure the parent counter's POWER switch is in the OFF position.

2) Remove the existing plug-in or blank plug-in currently installed in the counter. This is accomplished by turning the locking knob (located at the left of the plug-in receptacle) at least two complete turns in a counterclockwise direction and then pulling the plug-in out by its handle. Generally, a firm pull is required to unseat the connector.

3) Visually check the Model 1215 to ensure that the printed circuit boards are firmly seated, then insert the Model 1215 into the counter's now vacant receptacle until the plug-in's front panel is flush with the counter's front panel. A firm push is usually necessary to properly seat the connector at the rear of the plug-in.

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CHAPTER 3
OPERATION

3.1 FUNCTIONAL OPERATION

The Model 1215 500 MHz Prescaler Plug-in extends the digital frequency measuring capabilities of the Models 1037 and 1038 counters by scaling the input frequency by a factor of 4 (250 MHz range) or 8 (500 MHz range) and dividing the counter time base by the same factors. In this manner, the input signal frequency is brought within the measuring range of the counter yet the counter will (because of the time base extension) display the actual input frequency. The Model 1215 plug-in will accept input signals in the range of 10 MHz to 500 MHz at levels between 100 mV and 10V rms for prescaling and display on the parent counter.

3.2 FRONT PANEL DESCRIPTION

1) RANGE switch:
The RANGE switch (S-1) is a three-position rotary switch; 500 MHz, 250 MHz and COUNTER. In both the 500 MHz and 250 MHz positions, the input signal is applied directly to the INPUT BNC connector on the front panel of the plug-in. In the COUNTER position, the parent counter's Time Base is routed into the plug-in and back into the parent counter. IT IS NECESSARY TO APPLY THE INPUT SIGNAL TO THE PARENT COUNTER'S "C INPUT" IN THE "COUNTER" POSITION.

2) INPUT connector:
The INPUT connector is a BNC type connection on the front panel of the Model 1215 Plug-in. Its use is limited to the 500 MHz and 250 MHz positions ONLY as the input is applied directly to the 500 MHz Prescaler circuitry. The input signal level is limited to 10V rms maximum.

NOTE

Signals of a higher magnitude may damage the Model 1215 Extender Plug-in's circuitry.

3.3 OPERATIONAL CHECK

The following table (Table 3.1) lists the procedure by steps and the subsequent counter indications for the operational check of the Model 1215 Plug-in. Install the Model 1215 Plug-in as described in paragraph 2.4.

STEP	ACTION	INDICATION
1	Test of Parent Counter a) Set RANGE switch on plug-in to the COUNTER position.	

STEP	ACTION	INDICATION
	b) Place counter FUNCTION switch in the TEST position.	
	c) Turn DISPLAY control fully counter-clockwise.	
	d) On counter rear-panel, set the INTERNAL/EXTERNAL switch to INTERNAL.	
	e) Place counter TIME BASE switch in the 10^{-1} position.	
	f) Set the counter POWER switch to the ON position.	ON lamp illuminator display indicates 10 MHz
2	Test of Model 1215 Time Base Function	
	a) Set plug-in RANGE switch to 250 MHz.	Display should indicate 40 MHz
	b) Set plug-in RANGE switch to 500 MHz.	Display should indicate 80 MHz
3	Test of Model 1215 Prescale Function	
	a) Connect the 50Ω output from an HP 608C (or equivalent) signal generator to the INPUT connector of the plug-in.	
	b) Set the plug-in RANGE switch to the 250 MHz position.	
	c) Set the output of the signal generator for a 100 mV signal at 200 MHz.	
	d) Set the counter level control fully counter-clockwise.	
	e) Adjust the LEVEL control until a stable count is obtained.	Display should indicate 200 MHz
	f) Set the plug-in RANGE switch to the 500 MHz position.	
	g) Re-adjust the counter LEVEL control (if necessary) for a stable count.	Display should indicate 200 MHz

The Model 1215 Plug-in is now fully operational.

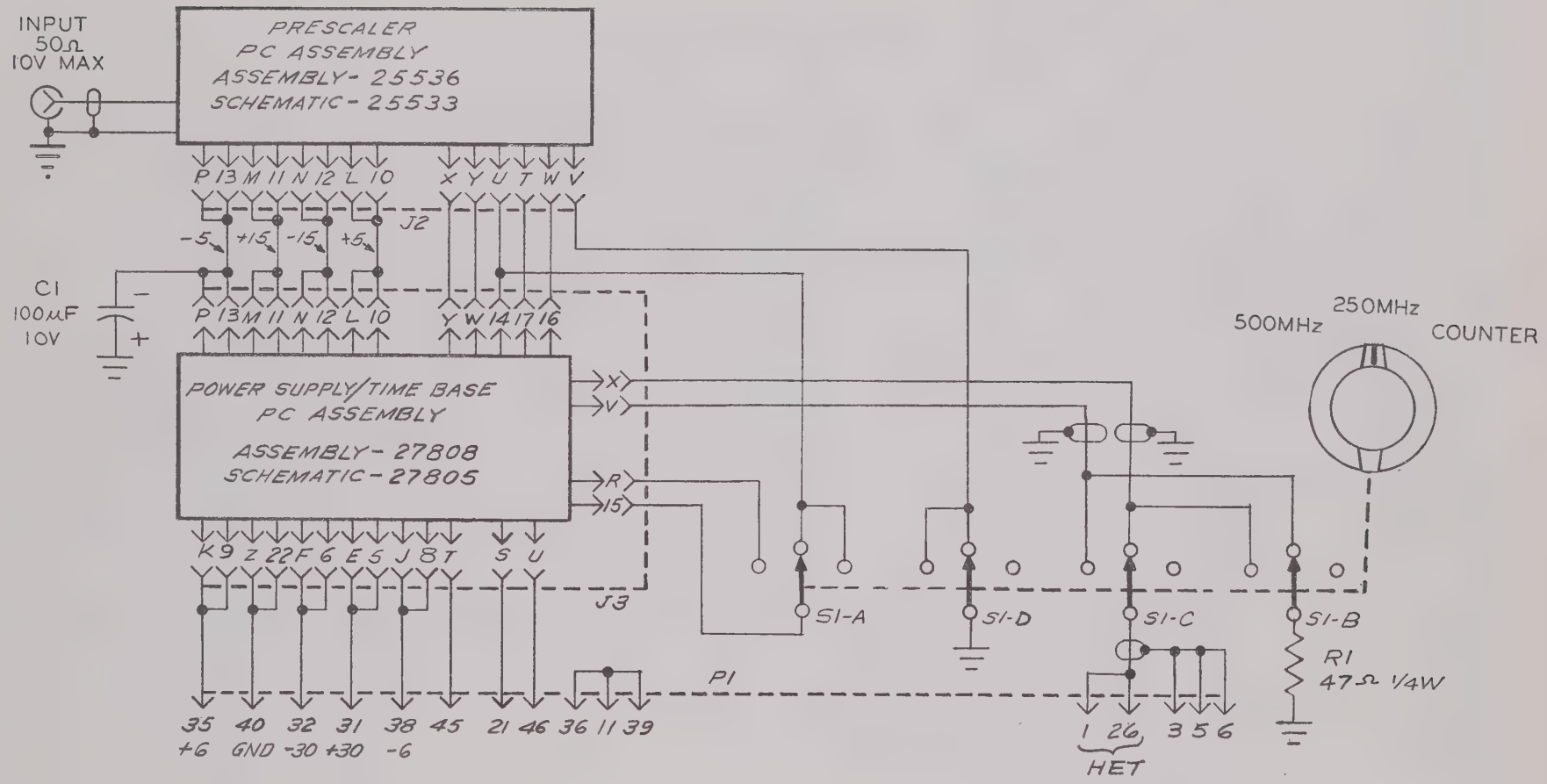
CHAPTER 4
DRAWINGS AND PARTS LIST

4.1 INTRODUCTION

The drawings and parts list for the various circuits in the Model 1215 are included in this section.

4.2 LIST OF DRAWINGS

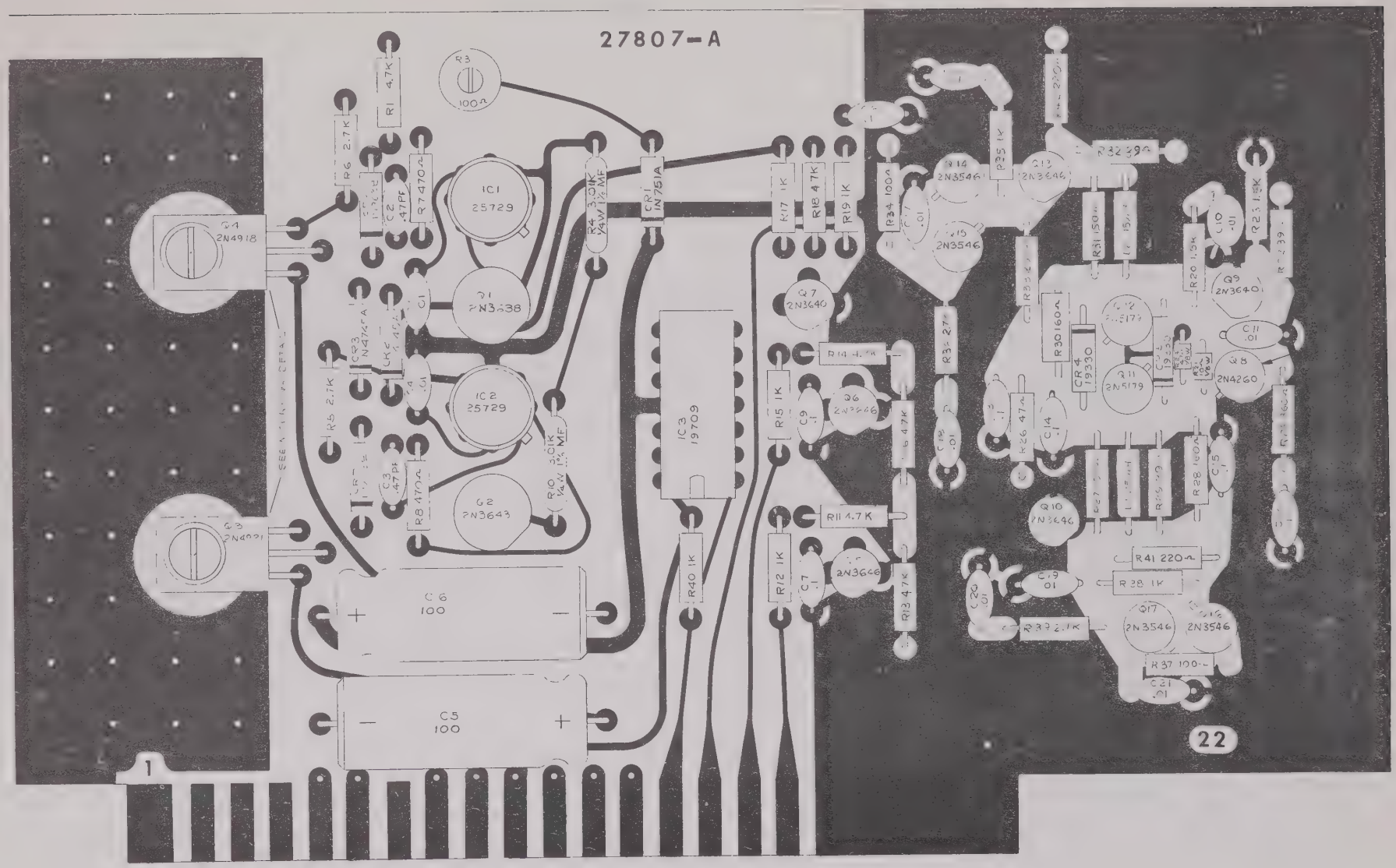
	ASSEMBLY	SCHEMATIC
Model 1215 Block Diagram		B27854B
Time Base/Power Supply	D27808B	C27805B
500 MHz Prescaler	C25536D	D25533D



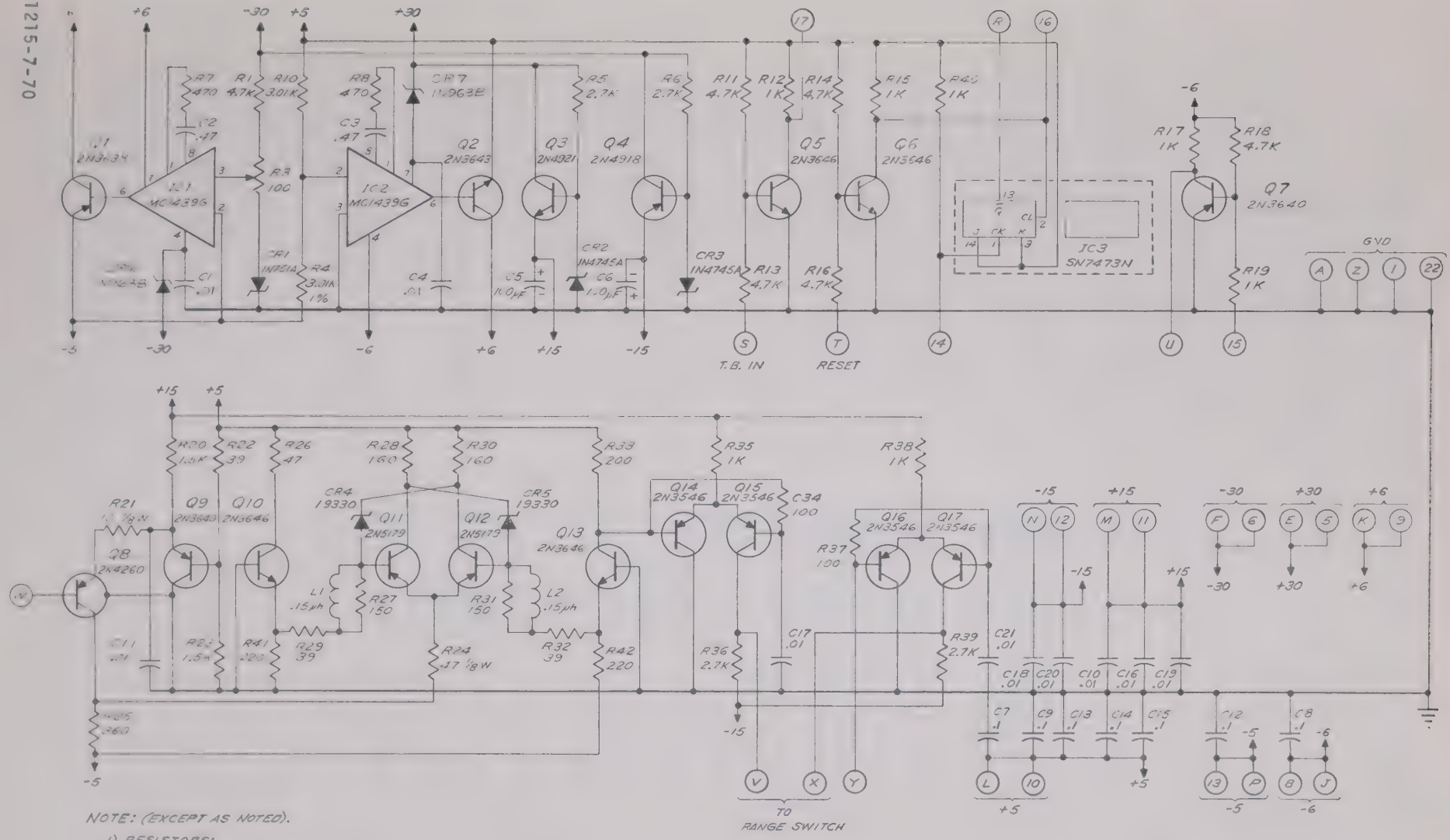
1215 BLOCK DIAGRAM B27854B

BLOCK DIAGRAM PARTS LIST

REF.	DESCRIPTION	SD PART NO.
C1	Capacitor, 100μF, 10V	C0369
J1	Connector, BNC	J0342
J2	Connector, 22 Pin	J0248
J3	Connector, 22 Pin	J0248
P1	Connector, 50 Pin	J0261
R1	Resistor, 47Ω, 1/4W, 5%	R0743
S1	Switch, Rotary	S0361



TIME BASE/POWER SUPPLY ASSEMBLY D27808B



NOTE: (EXCEPT AS NOTED).

1) RESISTORS:
VALUE - IN OHMS
POWER - 1/4 W.
TOL.--- 5%.

2) CAPACITORS:
VALUE - ALL CAPS IN µF.

TIME BASE/POWER SUPPLY SCHEMATIC C27805B

TIME BASE/POWER SUPPLY ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Time Base/Power Supply P.C. Board Assembly	D27808B
	Time Base/Power Supply P.C. Board Schematic	C27805B
C1	Capacitor, .01μF, Disc.	C0556
C2	Capacitor, .47pF, Disc.	C0655
C3	Capacitor, .47pF, Disc.	C0655
C4	Capacitor, .01μF, Disc.	C0556
C5	Capacitor, 100μF, 25V	C0832
C6	Capacitor, 100μF, 25V	C0832
C7	Capacitor, .1μF, Disc.	C0661
C8	Capacitor, .1μF, Disc.	C0661
C9	Capacitor, .1μF, Disc.	C0661
C10	Capacitor, .01μF, Disc.	C0556
C11	Capacitor, .01μF, Disc.	C0556
C12	Capacitor, .1μF, Disc.	C0661
C13	Capacitor, .1μF, Disc.	C0661
C14	Capacitor, .1μF, Disc.	C0661
C15	Capacitor, .1μF, Disc.	C0661
C16	Capacitor, .01μF, Disc.	C0556
C17	Capacitor, .01μF, Disc.	C0556
C18	Capacitor, .01μF, Disc.	C0556
C19	Capacitor, .01μF, Disc.	C0556
C20	Capacitor, .01μF, Disc.	C0556
C21	Capacitor, .01μF, Disc.	C0556
CR1	Diode, IN751A	CR0095
CR2	Diode, IN4745A	CR0349
CR3	Diode, IN4745A	CR0349
CR4	Diode, 19330	19330
CR5	Diode, 19330	19330

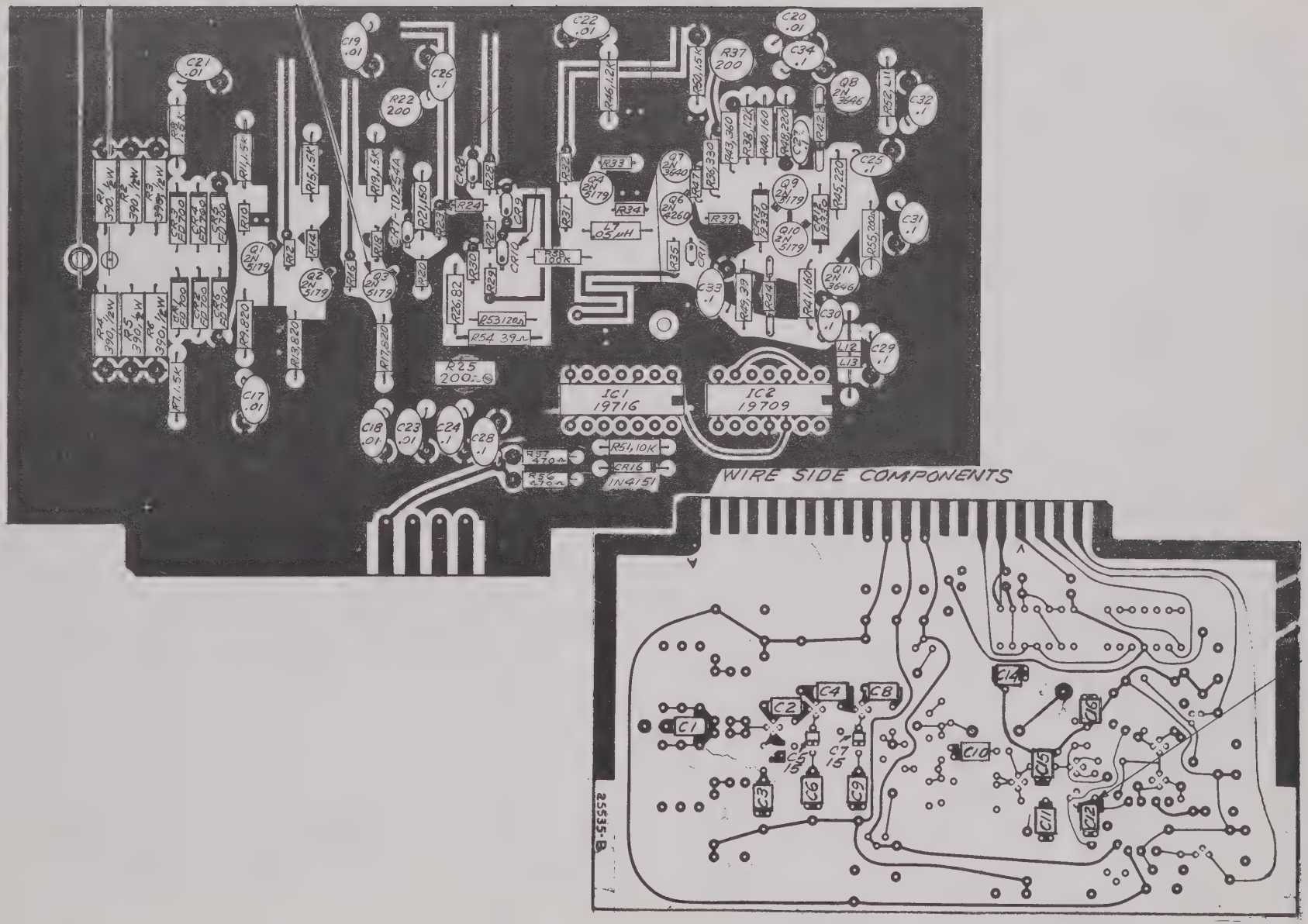
TIME BASE/POWER SUPPLY ASSEMBLY PARTS LIST (Con't.)

REF.	DESCRIPTION	SD PART NO.
CR6	Diode, IN963B	CR0174
CR7	Diode, IN963B	CR0174
IC1	Integrated Circuit, MC14396	25729
IC2	Integrated Circuit, MC14396	25729
IC3	Integrated Circuit, SN7473N	19709
L1	Inductor, .15μH	L0155
L2	Inductor, .15μH	L0155
Q1	Transistor, 2N3638	Q0181
Q2	Transistor, 2N3643	Q0179
Q3	Transistor, 2N4921	Q0267
Q4	Transistor, 2N4918	Q0268
Q5	Transistor, 2N3646	Q0218
Q6	Transistor, 2N3646	Q0218
Q7	Transistor, 2N3640	Q0178
Q8	Transistor, 2N4260	Q0272
Q9	Transistor, 2N3640	Q0178
Q10	Transistor, 2N3646	Q0218
Q11	Transistor, 2N5179	Q0269
Q12	Transistor, 2N5179	Q0269
Q13	Transistor, 2N3646	Q0218
Q14	Transistor, 2N3546	Q0192
Q15	Transistor, 2N3546	Q0192
Q16	Transistor, 2N3546	Q0192
Q17	Transistor, 2N3546	Q0192
R1	Resistor, 4.7k, 1/4W, 5%	R0892
R2	Not Used	
R3	Resistor, 100Ω, POT	R2374
R4	Resistor, 3.01k, MF, 1%	R0836
R5	Resistor, 2.7k, 1/4W, 5%	R0937

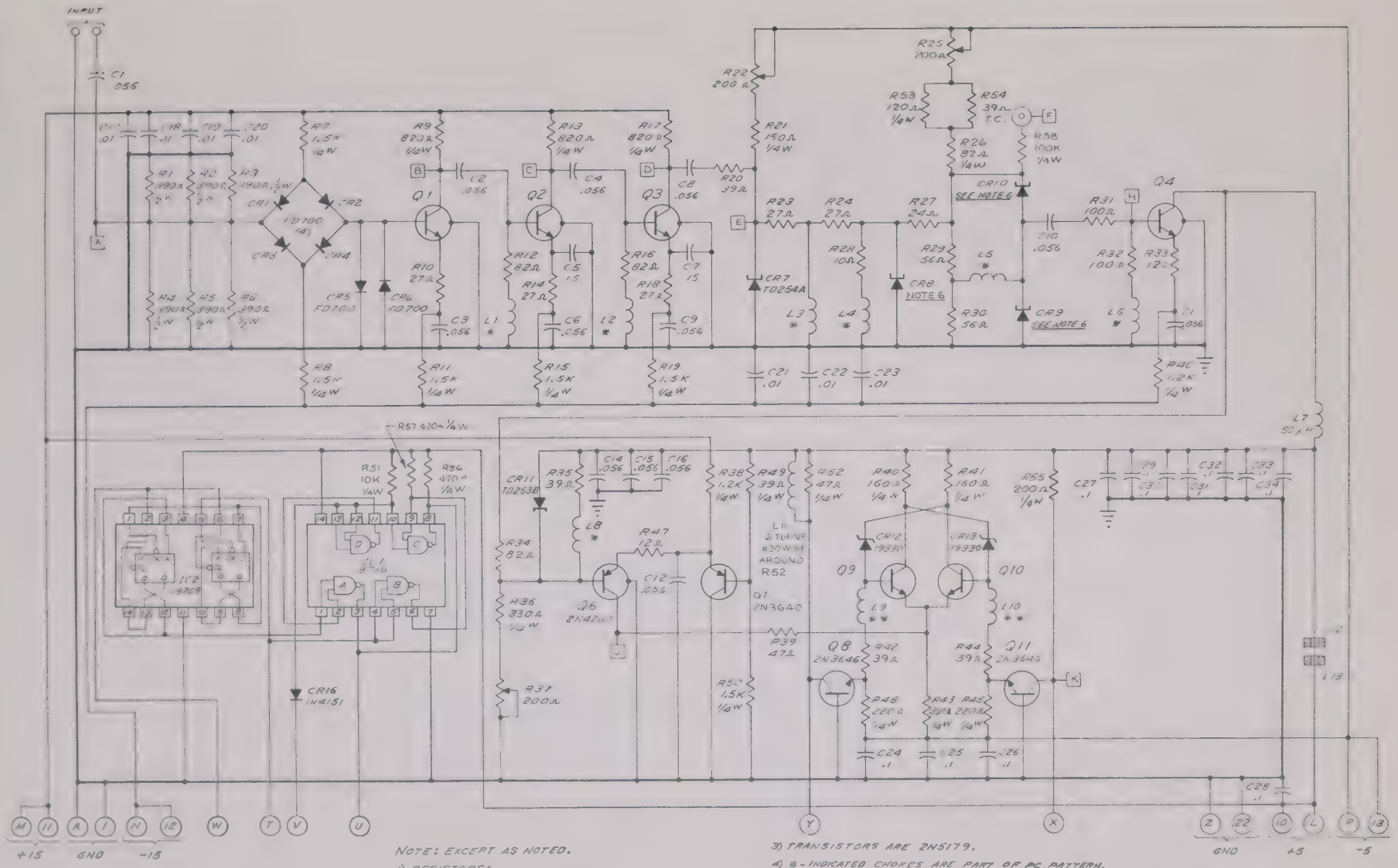
REF.	DESCRIPTION	SD PART NO.
R6	Resistor, 2.7k, 1/4W, 5%	R0937
R7	Resistor, 470Ω, 1/4W, 5%	R1044
R8	Resistor, 470Ω, 1/4W, 5%	R1044
R9	Not Used	
R10	Resistor, 3.01k, MF, 1%	R0836
R11	Resistor, 4.7k, 1/4W, 5%	R0892
R12	Resistor, 1k, 1/4W, 5%	R0765
R13	Resistor, 4.7k, 1/4W, 5%	R0892
R14	Resistor, 4.7k, 1/4W, 5%	R0892
R15	Resistor, 1k, 1/4W, 5%	R0765
R16	Resistor, 4.7k, 1/4W, 5%	R0892
R17	Resistor, 1k, 1/4W, 5%	R0756
R18	Resistor, 4.7k, 1/4W, 5%	R0892
R19	Resistor, 1k, 1/4W, 5%	R0765
R20	Resistor, 1.5k, 1/4W, 5%	R0783
R21	Resistor, 10Ω, 1/8W, 5%	R1866
R22	Resistor, 39Ω, 1/4W, 5%	R1552
R23	Resistor, 1.5k, 1/4W, 5%	R0783
R24	Resistor, 47Ω, 1/8W, 5%	R1449
R25	Resistor, 360Ω, 1/4W, 5%	R1571
R26	Resistor, 47Ω, 1/4W, 5%	R0743
R27	Resistor, 150Ω, 1/4W, 5%	R0983
R28	Resistor, 160Ω, 1/4W, 5%	R1572
R29	Resistor, 39Ω, 1/4W, 5%	R1552
R30	Resistor, 160Ω, 1/4W, 5%	R1572
R31	Resistor, 150Ω, 1/4W, 5%	R0983
R32	Resistor, 39Ω, 1/4W, 5%	R1552
R33	Resistor, 200Ω, 1/4W, 5%	R0736
R34	Resistor, 100Ω, 1/4W, 5%	R1441
R35	Resistor, 1k, 1/4W, 5%	R0765

TIME BASE/POWER SUPPLY ASSEMBLY PARTS LIST (Con't.)

REF.	DESCRIPTION	SD PART NO.
R36	Resistor, 2.7k, 1/4W, 5%	R0937
R37	Resistor, 100Ω, 1/4W, 5%	R1441
R38	Resistor, 1k, 1/4W, 5%	R0765
R39	Resistor, 2.7k, 1/4W, 5%	R0937
R40	Resistor, 1k, 1/4W, 5%	R0765
R41	Resistor, 220Ω, 1/4W, 5%	R0760
R42	Resistor, 220Ω, 1/4W, 5%	R0765



500 MHz PRESCALER ASSEMBLY C25536D



NOTE: EXCEPT AS NOTED.

1) RESISTORS:
POWER - - - - - 1/8 W.
TOL - - - - - - 5%.

2) CAPACITORS:
VALUE - - - - LESS THAN ONE IN μF.
" MORE " " " pF.

3) TRANSISTORS ARE 2N5179.

4) * - INDICATED CHOKES ARE PART OF PC PATTERN.
** - INDICATED CHOKES ARE RESISTOR PIGTAILS.
L12 & L13 ARE FERRITE BEADS.

5) [A] = TEST POINTS REFERRED TO IN ALIGNMENT PROCEEDURE 27782

6) MATCHED SET PER 27960.

500 MHz PRESCALER SCHEMATIC D25533D

500 MHz PRESCALER P.C. ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	500 MHz Prescaler P.C. Assembly	C25536D
	500 MHz Prescaler P.C. Assembly Schematic	D25533D
C1	Capacitor, .056pF, Chip	C1164
C2	Capacitor, .056pF, Chip	C1164
C3	Capacitor, .056pF, Chip	C1164
C4	Capacitor, .056pF, Chip	C1164
C5	Capacitor, 15pF, Chip	C1163
C6	Capacitor, .056pF, Chip	C1164
C7	Capacitor, 15pF, Chip	C1163
C8	Capacitor, .056pF, Chip	C1164
C9	Capacitor, .056pF, Chip	C1164
C10	Capacitor, .056pF, Chip	C1164
C11	Capacitor, .056pF, Chip	C1164
C12	Capacitor, .056pF, Chip	C1164
C13	Not Used	
C14	Capacitor, .056pF, Chip	C1164
C15	Capacitor, .056pF, Chip	C1164
C16	Capacitor, .056pF, Chip	C1164
C17	Capacitor, .01µF, 100V, Disc.	C0556
C18	Capacitor, .01µF, 100V, Disc.	C0556
C19	Capacitor, .01µF, 100V, Disc.	C0556
C20	Capacitor, .01µF, 100V, Disc.	C0556
C21	Capacitor, .01µF, 100V, Disc.	C0556
C22	Capacitor, .01µF, 100V, Disc.	C0556
C23	Capacitor, .01µF, 100V, Disc.	C0556
C24	Capacitor, .1µF, 10V, Disc.	C0661
C25	Capacitor, .1µF, 10V, Disc.	C0661

500 MHz PRESCALER P.C. ASSEMBLY PARTS LIST (Con't.)

REF.	DESCRIPTION	SD PART NO.
C26	Capacitor, .1μF, 10V, Disc.	C0661
C27	Capacitor, .1μF, 10V, Disc.	C0661
C28	Capacitor, .1μF, 10V, Disc.	C0661
C29	Capacitor, .1μF, 10V, Disc.	C0661
C30	Capacitor, .1μF, 10V, Disc.	C0661
C31	Capacitor, .1μF, 10V, Disc.	C0661
C32	Capacitor, .1μF, 10V, Disc.	C0661
C33	Capacitor, .1μF, 10V, Disc.	C0661
C34	Capacitor, .1μF, 10V, Disc.	C0661
CR1	Diode, FD700	CR0356
CR2	Diode, FD700	CR0356
CR3	Diode, FD700	CR0356
CR4	Diode, FD700	CR0356
CR5	Diode, FD700	CR0356
CR6	Diode, FD700	CR0356
CR7	Diode, TD254A	CR0360
CR8	Diode, Matched Set	A27960
CR9	Diode, Matched Set	A27960
CR10	Diode, Matched Set	A27960
CR11	Diode, TD253B	CR0357
CR12	Diode, 19330	A19330
CR13	Diode, 19330	A19330
CR14	Not Used	
CR15	Not Used	
CR16	Diode, IN4151	CR0150
L1	Trace Pattern	
L2	Trace Pattern	
L3	Trace Pattern	
L4	Trace Pattern	
L5	Trace Pattern	

500 MHz PRESCALER P.C. ASSEMBLY PARTS LIST (Con't.)

REF.	DESCRIPTION	SD PART NO.
L6	Trace Pattern	
L7	Inductor, .05μH	L0159
L8	Trace Pattern	
L9	P/O R42	
L10	P/O R44	
L11	Peaking Network	A27927
L12	Ferrite Bead	H0654
L13	Ferrite Bead	H0654
Q1	Transistor, 2N5179	Q0269
Q2	Transistor, 2N5179	Q0269
Q3	Transistor, 2N5179	Q0269
Q4	Transistor, 2N5179	Q0269
Q5	Not Used	
Q6	Transistor, 2N4260	Q0272
Q7	Transistor, 2N3640	Q0178
Q8	Transistor, 2N3646	Q0218
Q9	Transistor, 2N5179	Q0269
Q10	Transistor, 2N5179	Q0269
Q11	Transistor, 2N3646	Q0218
R1	Resistor, 390Ω, 1/2W, 5%	R0322
R2	Resistor, 390Ω, 1/2W, 5%	R0322
R3	Resistor, 390Ω, 1/2W, 5%	R0322
R4	Resistor, 390Ω, 1/2W, 5%	R0322
R5	Resistor, 390Ω, 1/2W, 5%	R0322
R6	Resistor, 390Ω, 1/2W, 5%	R0322
R7	Resistor, 1.5k, 1/4W, 5%	R0783
R8	Resistor, 1.5k, 1/4W, 5%	R0783
R9	Resistor, 820Ω, 1/4W, 5%	R0762
R10	Resistor, 27Ω, 1/8W, 5%	R1825

500 MHz PRESCALER P.C. ASSEMBLY PARTS LIST (Con't.)

REF.	DESCRIPTION	SD PART NO.
R11	Resistor, 1.5k, 1/4W, 5%	R0783
R12	Resistor, 82Ω, 1/8W, 5%	R1745
R13	Resistor, 820Ω, 1/4W, 5%	R0762
R14	Resistor, 27Ω, 1/8W, 5%	R1825
R15	Resistor, 1.5k, 1/4W, 5%	R0783
R16	Resistor, 82Ω, 1/8W, 5%	R1745
R17	Resistor, 820Ω, 1/4W, 5%	R0762
R18	Resistor, 27Ω, 1/8W, 5%	R1825
R19	Resistor, 1.5k, 1/4W, 5%	R0783
R20	Resistor, 39Ω, 1/8W, 5%	R1829
R21	Resistor, 150Ω, 1/4W, 5%	R0983
R22	Resistor, 200Ω, Pot (S.T.)	R2394
R23	Resistor, 27Ω, 1/8W, 5%	R1825
R24	Resistor, 27Ω, 1/8W, 5%	R1825
R25	Resistor, 200Ω, Pot, (M.T.)	R2425
R26	Resistor, 82Ω, 1/4W, 5%	R1059
R27	Resistor, 24Ω, 1/8W, 5%	R1824
R28	Resistor, 10Ω, 1/8W, 5%	R1866
R29	Resistor, 56Ω, 1/8W, 5%	R1833
R30	Resistor, 56Ω, 1/8W, 5%	R1833
R31	Resistor, 100Ω, 1/8W, 5%	R1441
R32	Resistor, 100Ω, 1/8W, 5%	R1441
R33	Resistor, 12Ω, 1/8W, 5%	R1840
R34	Resistor, 82Ω, 1/8W, 5%	R1745
R35	Resistor, 39Ω, 1/8W, 5%	R1829
R36	Resistor, 330Ω, 1/4W, 5%	R0662
R37	Resistor, 200Ω, Pot (S.T.)	R2394
R38	Resistor, 1.2k, 1/4W, 5%	R0809
R39	Resistor, 47Ω, 1/8W, 5%	R1449
R40	Resistor, 160Ω, 1/4W, 5%	R1572

500 MHz PRESCALER P.C. ASSEMBLY PARTS LIST (Con't.)

REF.	DESCRIPTION	SD PART NO.
R41	Resistor, 160Ω, 1/4W, 5%	R1572
R42	Resistor, 39Ω, 1/8W, 5%	R1829
R43	Resistor, 360Ω, 1/4W, 5%	R1571
R44	Resistor, 39Ω, 1/8W, 5%	R1829
R45	Resistor, 220Ω, 1/4W, 5%	R0760
R46	Resistor, 1.2k, 1/4W, 5%	R0809
R47	Resistor, 12Ω, 1/8W, 5%	R1840
R48	Resistor, 220Ω, 1/4W, 5%	R0760
R49	Resistor, 30Ω, 1/4W, 5%	R1552
R50	Resistor, 1.5k, 1/4W, 5%	R0783
R51	Resistor, 10k, 1/4W, 5%	R0766
R52	P/O L11	
R53	Resistor, 120Ω, 1/4W, 5%	R1461
R54	Resistor, TM 1/8, 39	R2447
R55	Resistor, 200Ω, 1/4W, 5%	R0736
R56	Resistor, 470Ω, 1/4W, 5%	R1044
R57	Resistor, 470Ω, 1/4W, 5%	R1044
R58	Resistor, 100k, 1/4W, 5%	R0741
IC1	Integrated Circuit, SN15846N	19716
IC2	Integrated Circuit, SN7473N	19709

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